ENGLISH

SHARP

SCIENTIFIC CALCULATOR

EL-509X
EL-531X
EL-531XG
MODEL **EL-531XH**

OPERATION MANUAL

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INTRODUCTION

Thank you for purchasing the SHARP Scientific Calculator Model EL-509X/531X/531XG/531XH.
About the **calculation examples (including some formulas and tables)**, refer to the reverse side of this English manual. **Refer to the number on the right of each title on the manual or case.**
After reading this manual, store it in a convenient location for future reference.
Note Some of the models described in this manual may not be available in some countries

Operational Notes

- Do not carry the calculator around in your back pocket, as it may break when you sit down. The display is made of glass and is particularly fragile
- Keep the calculator away from extreme heat such as on a car dashboard or near a heater, and avoid exposing it to excessively humid or dusty environments
- Since this product is not waterproof, do not use it or store it where fluids, for example water, can splash onto it. Raindrops, water spray, juice, coffee, steam, perspiration, etc will also cause malfunction
- Clean with a soft, dry cloth Do not use solvents or a wet cloth Avoid using a rough cloth or anything else that may cause scratches.
- Do not drop it or apply excessive force
- Never dispose of batteries in a fire
- Keep batteries out of the reach of children
- This product, including accessories, may change due to upgrading without prior notice

NOTICE

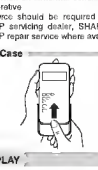
- SHARP strongly recommends that separate permanent written records be kept of all important data. Data may be lost or altered in virtually any electronic memory product under certain circumstances. Therefore, SHARP assumes no responsibility for data lost or otherwise rendered unusable whether as a result of improper use, repairs, defects, battery replacement, use after the specified battery life has expired, or any other cause
- SHARP will not be liable nor responsible for any incidental or consequential economic or property damage caused by misuse and/or malfunctions of this product and its peripherals, unless such liability is acknowledged by law

♦ Press the RESET switch (on the back), with the tip of a ballpoint pen or similar object, only in the following cases. Do not use an object with a breakable or sharp tip. Note that pressing the RESET switch erases all data stored in memory.

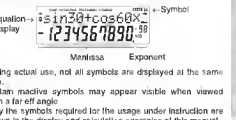
- When using for the first time
- After replacing the batteries
- To clear all memory contents
- When an abnormal condition occurs and all keys are inoperative

If service should be required on this calculator, use only a SHARP servicing dealer, SHARP approved service facility, or SHARP repair service where available

Hard Case



DISPLAY



- During actual use, not all symbols are displayed at the same time.
- Certain machine symbols may appear visible when viewed from a tar eff angle
- Only the symbols required for the usage under instruction are shown in the display and calculation examples of this manual

BEFORE USING THE CALCULATOR

Key Notation Used in this Manual

In this manual, key operations are described as follows

x^{-1} F (ln)	To specify x^{-1} : (2ndF) (x^{-1}) To specify ln : (ln) To specify F : (ALPHA) (F)

Functions that are printed in orange above the key require (2ndF) to be pressed first before the key. When you specify the memory, press (ALPHA) first Numbers for input value are not shown as keys, but as ordinary numbers.

Power On and Off

Press (ON/C) to turn the calculator on, and (2ndF) (OFF) to turn it off

Clearing the Entry and Memories

Clearing methods are described in the table as follows:

Clearing operation	Entry (Display)	M^{*1}	A F, X, Y^{*2} ANS^{*3}	STAT^{*4} STAT VAR^{*5}
(ON/C)	○	×	×	×
(2ndF) (CA)	○	×	○	○
(2ndF) (M-CLR) 0 (=)^{*6}	○	○	○	○
(2ndF) (M-CLR) 1 (=)^{*7}	○	○	○	○
RESET switch	○	○	○	○

○ : Clear × : Retain
*1 Independent memory M
*2 Temporary memory A-F, X and Y
*3 Last answer memory
*4 Statistical data (entered data)
*5 $\bar{x}$, $x\sigma_n$, $x\sigma_{n-1}$, Σx, Σx^2, $\bar{y}$, $y\sigma_n$, $y\sigma_{n-1}$, Σy, Σy^2, Σxy, r, a, b, c
*6 All variables are cleared. See 'About the Memory clear key' for details.
*7 This key combination functions the same as the RESET switch See 'About the Memory clear key' for details

[About the Memory clear key]
Press (2ndF) (M-CLR) to display the menu

```
MEM RESET
  0   1
```

- To clear all variables (M, A F, X, Y, ANS, STAT/VAR), press 0 (=).
- To RESET the calculator, press 1 (=) or (-) (=). The RESET operation will erase all data stored in memory, and restore the calculator's default setting.

Entering and Correcting the Equation

[Cursor keys]

- Press (◀) or (▶) to move the cursor You can also return to the equation after getting an answer by pressing (▶) (◀). See the next section for using the (▲) and (▼) keys.
- In the SET UP menu and other locations, use the (◀) or (▶) key to move the flashing cursor, then press (ENT) (= key) If you need to scroll up/down the view, use the (▲) or (▼) key.

[Insert mode and Overwrite mode in the Equation display]

- This calculator has two editing modes: Insert mode (default), and overwrite mode. Pressing (2ndF) (INS) switches between the two modes. A triangular cursor indicates that an entry will be inserted at the cursor, while the rectangular cursor indicates to overwrite preexisting data as you make entries.
- To insert a number in the Insert mode, move the cursor to the place immediately after where you wish to insert, then make a desired entry In the overwrite mode, data under the cursor will be overwritten by the number you enter
- This mode setting will be retained until the next RESET operation is executed

[Deletion key]

- To delete a number/function, move the cursor to the number/function you wish to delete, then press (DEL) If the cursor is located at the right end of an equation, the (DEL) key will function as a back space key

Multi-line Playback function [1]

This calculator is equipped with a function to recall previous equations in the normal mode. Equations also include calculation ending instructions such as "=" and a maximum of 142 characters can be stored in memory. When the memory is full, stored equations are deleted in the order of the oldest first. Pressing (▲) will display the previous equation and the answer. Further pressing (▲) will display preceding equations (after returning to the previous equation, press (▼) to view equations in order) In addition, (2ndF) (▲) can be used to jump to the oldest equation

- To edit an equation after recalling it press (▶) (◀)
- To edit the displayed equation, press (▶) (◀) immediately after obtaining a calculation answer
- The multi-line memory is cleared by the following operations: (2ndF) (CA), (2ndF) (OFF) (including the Automatic Power Off feature), mode change, memory clear ((2ndF) (M-CLR)), RESET, (2ndF) (MODE), (FSE) (▶), (ANS) (constant calculation, decimal calculation, angle unit conversion, coordinate conversion, N-base conversion, numerical value storage to the temporary memories and independent memory, and input/deletion at statistical data

Priority Levels in Calculation

This calculator performs operations according to the following priority ① Fractions (1↵4, etc.) ② Functions preceded by their argument (√, x^2, x^3, x^{-1}, etc.) ③ Y^X, $\sqrt[x]{}$ ④ Implied multiplication of a memory value (2Y, etc.) ⑤ Functions followed by their argument (sin, cos, etc.) ⑥ Implied multiplication of a function (2sin30, etc.) ⑦ ×, ÷, ⑧ +, − ⑨ AND ⑩ OR, XOR, XNOR ⑪ =, M+, M−, ▶DMS, ▶DEG, ▶RAD, ▶GRAD, DATA, CD, →r θ, →xy and other calculation ending instructions

- If parentheses are used, parenthesized calculations have precedence over any other calculations.

INITIAL SET UP

Mode Selection

Normal mode (NORMAL), (MODE) 0

Used to perform arithmetic operations and function calculations.

Statistics mode (STAT): (MODE) (-)

Used to perform statistical calculations

When executing mode selection, temporary memories, statistical variables, statistical data and last answer memory will be cleared even when reselecting the same mode

SET UP menu

Press (SET UP) to display the SET UP menu.

```
FSE TAB
  0
```

- A menu item can be selected by:
  - moving the flashing cursor by using (▶) (◀), then press (ENT) (= key), or
  - pressing the number key corresponding to the menu item number
- If ▲ or ▼ is displayed on the screen press (▲) or (▼) to view the previous/next menu screen
- Press (ON/C) to exit the SET UP menu.

[Selecting the Display Notation and Decimal Places]

The calculator has four display notation systems (Floating point, Fixed decimal point, Scientific notation and Engineering notation) for displaying calculation results.

- When the FIX, SCI, or ENG symbol is displayed, the number of decimal places (TAB) can be set to any value between 0 and 9. Displayed values will be reduced to the corresponding number of digits.
- If a floating point number does not fit in the specified range, the calculator will display the result using the scientific notation (exponential notation) system. See 'Setting the Floating Point Numbers System in Scientific Notation' for details.
- Press (SET UP), followed by 0, to display the following submenu:

```
-FIX SCI ENG   →  -NORM1 NORM2
 0   1   2        3   4
```

[Setting the Floating Point Numbers System in Scientific Notation]

The calculator has two settings for displaying a floating point number. NORM1 (default setting) and NORM2. In each display setting, a number is automatically displayed in scientific notation outside a preset range:

- NORM1: $0.000000001 \leq |x| \leq 9999999999$
- NORM2: $0.01 \leq |x| \leq 9999999999$

100000−5=	
[Floating point (NORM1)]	(MODE) 100000 (−) 5 (=) 33'333 33333
−[Fixed decimal point]	(SET UP) 3 (=) 33 333 33333
[TAB set to 2]	(SET UP) 2 (=) 33'333 33
−[SCIentific notation]	(SET UP) 1 (=) 3.33×10^{4}
−[ENGineering notation]	(SET UP) 2 (=) 33.33×10^{3}
−[Floating point (NORM1)]	(SET UP) 0 (=) 33 333 33333

5−1000=	
[Floating point (NORM1)]	(MODE) 5 (−) 1000 (=) 0.003
−[Floating point (NORM2)]	(SET UP) 2 (=) 3×10^{-3}
−[Floating point (NORM1)]	(SET UP) 0 (=) 0.003

- The previous calculation result will not be recalled after entering multiple instructions
- In the case of utilizing postfix functions (x², sin, etc.), you can perform a chain calculation even when the previous calculation result is cleared by the use of the (ON/C) key.

Fraction Calculations [8]

This calculator performs arithmetic operations and memory calculations using fractions, and conversion between a decimal number and a fraction

- If the number of digits to be displayed is greater than 10, the number is converted to and displayed as a decimal number

Binary, Pental, Octal, Decimal, and Hexadecimal Operations (N-Base) [9]

This calculator can perform conversions between numbers expressed in binary, pental, octal, decimal and hexadecimal systems. It can also perform the four basic arithmetic operations, calculations with parentheses and memory calculations using binary, pental, octal, decimal, and hexadecimal numbers. In addition, the calculator can carry out the logical operations AND, OR, NOT, NEG, XOR and XNOR on binary, pental, octal and hexadecimal numbers.
Conversion to each system is performed by the following keys

(2ndF) (▶BIN)	Converts to the binary system "$_b$" appears
(2ndF) (▶PEN)	Converts to the pental system "$_P$" appears.
(2ndF) (▶OCT)	Converts to the octal system. "$_O$" appears
(2ndF) (▶DEC)	Converts to the decimal system "$_d$" appears.
(2ndF) (▶HEX)	Converts to the hexadecimal system "$_H$" appears

(2ndF) (▶DEC) Converts to the decimal system "$_b$", "$_P$", "$_O$", and "$_H$" disappear from the display.

Conversion is performed on the displayed value when these keys are pressed

Note In this calculator, the hexadecimal numbers A − F are entered by pressing (x²) (√) (x³) (∛) (ln), and (sin) and displayed as follows:

A → $_H$, B → $_b$, C → $_\ell$, D → $_d$, E → $_E$, F → $_F$

In the binary, pental, octal, and hexadecimal systems, fractional parts cannot be entered When a number having a fractional part is converted into a binary, pental, octal, or hexadecimal number, the fractional part will be truncated Likewise, when the result of a binary, pental, octal, or hexadecimal calculation includes a fractional part, the fractional part will be truncated In the binary, pental, octal, and hexadecimal systems, negative numbers are displayed as a complement.

Time, Decimal and Sexagesimal Calculations [10]

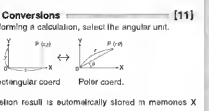
Conversion between decimal and sexagesimal numbers can be performed. In addition, the four basic arithmetic operations and memory calculations can be carried out using the sexagesimal system.
Relation for sexagesimal is as follows:

12°34'56"

degree — second
minute

Coordinate Conversions [11]

- Before performing a calculation, select the angular unit.



- The calculation result is automatically stored in memories X and Y
  Value of r or x: X memory
  Value of θ or y: Y memory

Modify Function [12]

In this calculator, calculation results are internally obtained in scientific notation with up to 14 digits for the mantissa However, since calculation results are displayed in the form designated by the display notation and the number of decimal places indicated, the internal calculation result may differ from that shown in the display By using the modify function, the internal value is converted to match that of the display, so that the displayed value can be used without change in subsequent operations.

STATISTICAL CALCULATIONS [13]

Statistical calculations are performed in the statistics mode. Press (MODE) (-) to select the statistics mode. This calculator performs the seven statistical calculations indicated below After selecting the statistics mode, select the desired sub-mode by pressing the number key corresponding to your choice
When changing to the statistical sub-mode, press the corresponding number key after performing the operation to select the statistics mode (press (MODE) (-)).

0 (SD)	Single-variable statistics
1 (LINE)	Linear regression calculation
2 (QUAD)	Quadratic regression calculation
3 (EXP)	Exponential regression calculation
4 (LOG)	Logarithmic regression calculation
5 (PWR)	Power regression calculation
6 (INV)	Inverse regression calculation

The following statistics can be obtained for each statistical calculation (refer to the table below)

Single-variable statistical calculation
Statistics of ①

Linear regression calculation
Statistics of ① and ②, and, in addition, estimate of y for a given x (estimate y') and estimate of x for a given y (estimate x')

Exponential regression, Logarithmic regression, Power regression, and Inverse regression calculation
Statistics of ① and ②. In addition, estimate of y for a given x and estimate of x for a given y (Since the calculator converts each formula into a linear regression formula before actual calculation takes place, it obtains all statistics, except coefficients a and b, from converted data rather than entered data.)

Quadratic regression calculation
Statistics of ① and ② and coefficients a, b, c in the quadratic regression formula ($y = a + bx + cx^2$). (For quadratic regression calculations, no correlation coefficient (r) can be obtained.) When there are two x' values, press (2ndF) (←→).
When performing calculations using a, b and c, only one numeric value can be held.

①	$\bar{x}$	Mean of samples (x data)
	$x\sigma_n$	Sample standard deviation (x data)
	$x\sigma_{n-1}$	Population standard deviation (x data)
	n	Number of samples
	Σx	Sum of samples (x data)
	Σx^2	Sum of squares of samples (x data)
②	$\bar{y}$	Mean of samples (y data)
	$y\sigma_n$	Sample standard deviation (y data)
	$y\sigma_{n-1}$	Population standard deviation (y data)
	Σy	Sum of samples (y data)
	Σy^2	Sum of squares of samples (y data)
	Σxy	Sum of products of samples (x, y)
	r	Correlation coefficient
	a	Coefficient of regression equation
	b	Coefficient of regression equation
	c	Coefficient of quadratic regression equation

- Use (ALPHA) and (RCL) to perform a STAT variable calculation

Data Entry and Correction [14]

Entered data are kept in memory until (2ndF) (CA) are pressed or mode selection Before entering new data, clear the memory contents

[Data Entry]
Single-variable data
Data (DATA)
Data (n=1) *frequency* (DATA) (To enter multiples of the same data)
Two-variable data
Data x (DATA) *Data y* (DATA)
Data x (n=1) *Data y* (n=1) *frequency* (DATA) (To enter multiples of the same data x and y)

- Up to 100 data items can be entered With the single-variable data, a data item without frequency assignment is counted as one data item, while an item assigned with frequency is stored as a set of two data items. With the two-variable data, a set of data items without frequency assignment is counted as two data items, while a set of items assigned with frequency is stored as a set of three data items.

[Data Correction]
Correction prior to pressing (DATA) Immediately after a data entry Delete incorrect data with (ON/C), then enter the correct data

Correction after pressing (DATA)
Use (▲) (▼) to display the data previously entered
Press (▼) to display data items in ascending (oldest first) order. To reverse the display order to descending (latest first), press the (▲) key.
Each item is displayed with 'Xnn=', 'Ynn=', or 'Nn=' (nn is the sequential number of the data set).
Display the data item to modify, Input the correct value, then press (DATA). Using (0) (=), you can correct the values of the data set all at once

- When ▲ or ▼ appears, more data items can be browsed by pressing (▲) or (▼)
- To delete a data set, display an item of the data set to delete, then press (2ndF) (CD). The data set will be deleted.
- To add a new data set, press (ON/C) and input the values, then press (DATA)

[Deletion key]

- To delete a number/function, move the cursor to the number/function you wish to delete, then press (DEL) If the cursor is located at the right end of an equation, the (DEL) key will function as a back space key

Multi-line Playback function [1]

This calculator is equipped with a function to recall previous equations in the normal mode. Equations also include calculation ending instructions such as "=" and a maximum of 142 characters can be stored in memory. When the memory is full, stored equations are deleted in the order of the oldest first. Pressing (▲) will display the previous equation and the answer. Further pressing (▲) will display preceding equations (after returning to the previous equation, press (▼) to view equations in order) In addition, (2ndF) (▲) can be used to jump to the oldest equation

- To edit an equation after recalling it press (▶) (◀)
- To edit the displayed equation, press (▶) (◀) immediately after obtaining a calculation answer
- The multi-line memory is cleared by the following operations: (2ndF) (CA), (2ndF) (OFF) (including the Automatic Power Off feature), mode change, memory clear ((2ndF) (M-CLR)), RESET, (2ndF) (MODE), (FSE) (▶), (ANS) (constant calculation, decimal calculation, angle unit conversion, coordinate conversion, N-base conversion, numerical value storage to the temporary memories and independent memory, and input/deletion at statistical data

Priority Levels in Calculation

This calculator performs operations according to the following priority ① Fractions (1↵4, etc.) ② Functions preceded by their argument (x⁻¹, x², x³, etc.) ③ Y^X, $\sqrt[x]{}$ ④ Implied multiplication of a memory value (2Y, etc.) ⑤ Functions followed by their argument (sin, cos, etc.) ⑥ Implied multiplication of a function (2sin30, etc.) ⑦ ×, ÷, ⑧ +, − ⑨ AND ⑩ OR, XOR, XNOR ⑪ =, M+, M−, ▶DMS, ▶DEG, ▶RAD, ▶GRAD, DATA, CD, →r θ, →xy and other calculation ending instructions

- If parentheses are used, parenthesized calculations have precedence over any other calculations.

INITIAL SET UP

Mode Selection

Normal mode (NORMAL), (MODE) 0

Used to perform arithmetic operations and function calculations.

Statistics mode (STAT): (MODE) (-)

Used to perform statistical calculations

When executing mode selection, temporary memories, statistical variables, statistical data and last answer memory will be cleared even when reselecting the same mode

SET UP menu

Press (SET UP) to display the SET UP menu.

```
FSE TAB
  0
```

- A menu item can be selected by:
  - moving the flashing cursor by using (▶) (◀), then press (ENT) (= key), or
  - pressing the number key corresponding to the menu item number
- If ▲ or ▼ is displayed on the screen press (▲) or (▼) to view the previous/next menu screen
- Press (ON/C) to exit the SET UP menu.

[Selecting the Display Notation and Decimal Places]

The calculator has four display notation systems (Floating point, Fixed decimal point, Scientific notation and Engineering notation) for displaying calculation results.

- When the FIX, SCI, or ENG symbol is displayed, the number of decimal places (TAB) can be set to any value between 0 and 9. Displayed values will be reduced to the corresponding number of digits.
- If a floating point number does not fit in the specified range, the calculator will display the result using the scientific notation (exponential notation) system. See 'Setting the Floating Point Numbers System in Scientific Notation' for details.
- Press (SET UP), followed by 0, to display the following submenu:

```
-FIX SCI ENG   →  -NORM1 NORM2
 0   1   2        3   4
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[Setting the Floating Point Numbers System in Scientific Notation]

The calculator has two settings for displaying a floating point number. NORM1 (default setting) and NORM2. In each display setting, a number is automatically displayed in scientific notation outside a preset range:

- NORM1: $0.000000001 \leq |x| \leq 9999999999$
- NORM2: $0.01 \leq |x| \leq 9999999999$

100000−5=	
[Floating point (NORM1)]	(MODE) 100000 (−) 5 (=) 33'333 33333
−[Fixed decimal point]	(SET UP) 3 (=) 33 333 33333
[TAB set to 2]	(SET UP) 2 (=) 33'333 33
−[SCIentific notation]	(SET UP) 1 (=) 3.33×10^{4}
−[ENGineering notation]	(SET UP) 2 (=) 33.33×10^{3}
−[Floating point (NORM1)]	(SET UP) 0 (=) 33 333 33333

5−1000=	
[Floating point (NORM1)]	(MODE) 5 (−) 1000 (=) 0.003
−[Floating point (NORM2)]	(SET UP) 2 (=) 3×10^{-3}
−[Floating point (NORM1)]	(SET UP) 0 (=) 0.003

- The previous calculation result will not be recalled after entering multiple instructions
- In the case of utilizing postfix functions (x², sin, etc.), you can perform a chain calculation even when the previous calculation result is cleared by the use of the (ON/C) key.

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- If the number of digits to be displayed is greater than 10, the number is converted to and displayed as a decimal number

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Conversion to each system is performed by the following keys

(2ndF) (▶BIN)	Converts to the binary system "$_b$" appears
(2ndF) (▶PEN)	Converts to the pental system "$_P$" appears.
(2ndF) (▶OCT)	Converts to the octal system. "$_O$" appears
(2ndF) (▶DEC)	Converts to the decimal system "$_d$" appears.
(2ndF) (▶HEX)	Converts to the hexadecimal system "$_H$" appears

(2ndF) (▶DEC) Converts to the decimal system "$_b$", "$_P$", "$_O$", and "$_H$" disappear from the display.

Conversion is performed on the displayed value when these keys are pressed

Note In this calculator, the hexadecimal numbers A − F are entered by pressing (x²) (√) (x³) (∛) (ln), and (sin) and displayed as follows:

A → $_H$, B → $_b$, C → $_\ell$, D → $_d$, E → $_E$, F → $_F$

In the binary, pental, octal, and hexadecimal systems, fractional parts cannot be entered When a number having a fractional part is converted into a binary, pental, octal, or hexadecimal number, the fractional part will be truncated Likewise, when the result of a binary, pental, octal, or hexadecimal calculation includes a fractional part, the fractional part will be truncated In the binary, pental, octal, and hexadecimal systems, negative numbers are displayed as a complement.

Time, Decimal and Sexagesimal Calculations [10]

Conversion between decimal and sexagesimal numbers can be performed. In addition, the four basic arithmetic operations and memory calculations can be carried out using the sexagesimal system.
Relation for sexagesimal is as follows:

12°34'56"

degree — second
minute

Coordinate Conversions [11]

- Before performing a calculation, select the angular unit.

- The calculation result is automatically stored in memories X and Y
  Value of r or x: X memory
  Value of θ or y: Y memory

Modify Function [12]

In this calculator, calculation results are internally obtained in scientific notation with up to 14 digits for the mantissa However, since calculation results are displayed in the form designated by the display notation and the number of decimal places indicated, the internal calculation result may differ from that shown in the display By using the modify function, the internal value is converted to match that of the display, so that the displayed value can be used without change in subsequent operations.

STATISTICAL CALCULATIONS [13]

Statistical calculations are performed in the statistics mode. Press (MODE) (-) to select the statistics mode. This calculator performs the seven statistical calculations indicated below After selecting the statistics mode, select the desired sub-mode by pressing the number key corresponding to your choice
When changing to the statistical sub-mode, press the corresponding number key after performing the operation to select the statistics mode (press (MODE) (-)).

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The following statistics can be obtained for each statistical calculation (refer to the table below)

Single-variable statistical calculation
Statistics of ①

Linear regression calculation
Statistics of ① and ②, and, in addition, estimate of y for a given x (estimate y') and estimate of x for a given y (estimate x')

Exponential regression, Logarithmic regression, Power regression, and Inverse regression calculation
Statistics of ① and ②. In addition, estimate of y for a given x and estimate of x for a given y (Since the calculator converts each formula into a linear regression formula before actual calculation takes place, it obtains all statistics, except coefficients a and b, from converted data rather than entered data.)

Quadratic regression calculation
Statistics of ① and ② and coefficients a, b, c in the quadratic regression formula ($y = a + bx + cx^2$). (For quadratic regression calculations, no correlation coefficient (r) can be obtained.) When there are two x' values, press (2ndF) (←→).
When performing calculations using a, b and c, only one numeric value can be held.

①	$\bar{x}$	Mean of samples (x data)
	$x\sigma_n$	Sample standard deviation (x data)
	$x\sigma_{n-1}$	Population standard deviation (x data)
	n	Number of samples
	Σx	Sum of samples (x data)
	Σx^2	Sum of squares of samples (x data)
②	$\bar{y}$	Mean of samples (y data)
	$y\sigma_n$	Sample standard deviation (y data)
	$y\sigma_{n-1}$	Population standard deviation (y data)
	Σy	Sum of samples (y data)
	Σy^2	Sum of squares of samples (y data)
	Σxy	Sum of products of samples (x, y)
	r	Correlation coefficient
	a	Coefficient of regression equation
	b	Coefficient of regression equation
	c	Coefficient of quadratic regression equation

- Use (ALPHA) and (RCL) to perform a STAT variable calculation

Data Entry and Correction [14]

Entered data are kept in memory until (2ndF) (CA) are pressed or mode selection Before entering new data, clear the memory contents

[Data Entry]
Single-variable data
Data (DATA)
Data (n=1) *frequency* (DATA) (To enter multiples of the same data)
Two-variable data
Data x (DATA) *Data y* (DATA)
Data x (n=1) *Data y* (n=1) *frequency* (DATA) (To enter multiples of the same data x and y)

- Up to 100 data items can be entered With the single-variable data, a data item without frequency assignment is counted as one data item, while an item assigned with frequency is stored as a set of two data items. With the two-variable data, a set of data items without frequency assignment is counted as two data items, while a set of items assigned with frequency is stored as a set of three data items.

[Data Correction]
Correction prior to pressing (DATA) Immediately after a data entry Delete incorrect data with (ON/C), then enter the correct data

Correction after pressing (DATA)
Use (▲) (▼) to display the data previously entered
Press (▼) to display data items in ascending (oldest first) order. To reverse the display order to descending (latest first), press the (▲) key.
Each item is displayed with 'Xnn=', 'Ynn=', or 'Nn=' (nn is the sequential number of the data set).
Display the data item to modify, Input the correct value, then press (DATA). Using (0) (=), you can correct the values of the data set all at once

- When ▲ or ▼ appears, more data items can be browsed by pressing (▲) or (▼)
- To delete a data set, display an item of the data set to delete, then press (2ndF) (CD). The data set will be deleted.
- To add a new data set, press (ON/C) and input the values, then press (DATA)

Statistical Calculation Formulae [15]

Type	Regression formula
Linear	$y = a + bx$
Exponential	$y = a \cdot e^{bx}$
Logarithmic	$y = a + b \cdot \ln x$
Power	$y = a \cdot x^b$
Inverse	$y = a + b \cdot \frac{1}{x}$
Quadratic	$y = a + bx + cx^2$

In the statistical calculation formulas, an error will occur when:

- The absolute value of the intermediate result or calculation result is equal to or greater than 1×10^{100}
- The denominator is zero
- An attempt is made to take the square root of a negative number
- No solution exists in the quadratic regression calculation.

ERROR AND CALCULATION RANGES

Errors

An error will occur if an operation exceeds the calculation ranges, or if a mathematically illegal operation is attempted. When an error occurs, pressing (◀) (or (▶)) automatically moves the cursor back to the place in the equation where the error occurred Edit the equation or press (ON/C) to clear the equation

Error Codes and Error Types

Syntax error (Error 1)

- An attempt was made to perform an invalid operation
  Ex. 2 (DATA) (=)

Calculation error (Error 2)

- The absolute value of an intermediate or final calculation result equals or exceeds 10^{100}
- An attempt was made to divide by 0 (or an intermediate calculation resulted in zero)
- The calculation ranges were exceeded while performing calculations

Depth error (Error 3)

- The available number of buffers was exceeded. (There are 10 buffers' for numeric values and 24 buffers for calculation instructions) *5 buffers in STAT mode
- Data items exceeded 100 in the statistics mode

Equation too long (Error 4):

- The equation exceeded its maximum input buffer (142 characters). An equation must be shorter than 142 characters

Calculation Ranges [16]

- **Within the ranges specified, this calculator is accurate to ±1 of the least significant digit of the mantissa. However, a calculation error increases in continuous calculations due to accumulation of each calculation error. (This is the same for $\sqrt{}$, x^2, x^3, x^{-1}, etc., where continuous calculations are performed internally.)**
  Additionally, a calculation error will accumulate and become larger in the vicinity of inflection points and singular points of functions.
- Calculation ranges
  $\pm 1 \times 10^{-99} \sim \pm 9.999999999 \times 10^{99}$ and 0.

If the absolute value of an entry or a final or intermediate result of a calculation is less than 10^{-99}, the value is considered to be 0 in calculations and in the display.

BATTERY REPLACEMENT

Notes on Battery Replacement

Improper handling of batteries can cause electrolyte leakage or explosion Be sure to observe the following handling rules

- Make sure the new batteries are the correct type.
- When installing, insert each battery properly as indicated in the calculator
- Batteries are factory-installed before shipment, and may be exhausted before they reach the service life stated in the specifications

Notes on erasure of memory contents
When the battery is replaced, the memory contents are erased Erasure can also occur if the calculator is defective or when it is repaired. Make a note of all important memory contents in case accidental erasure occurs

When to Replace the Batteries

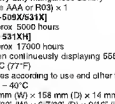
[EL-509X/531X/531XH] If the display has poor contrast, the batteries require replacement
[EL 531XG] If the display has poor contrast or nothing appears on the display even when (ON/C) is pressed in dim lighting, it is time to replace the batteries.

Cautions

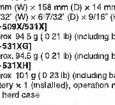
- Fluid from a leaking battery accidentally entering an eye could result in serious injury. Should this occur, wash with clean water and immediately consult a doctor.
- Should fluid from a leaking battery come in contact with your skin or clothes, immediately wash with clean water
- If the product is not to be used for some time, to avoid damage to the unit from leaking batteries, remove them and store in a safe place
- Do not leave exhausted batteries inside the product.
- Keep batteries out of the reach of children.
- Exhausted batteries left in the calculator may leak and damage the calculator.
- Explosion risk may be caused by incorrect handling
- Do not throw batteries into a fire as they may explode.

Replacement Procedure

1. Turn the power off by pressing (2ndF) (OFF)
2. Remove one screw or two screws (Fig 1)
3. Lift the battery cover to remove.
4. **[EL-509X/531X/531XG]** Remove the used battery by prying it out with a ball-point pen or other similar pointed device (Fig 2)
   [EL-531XH] Remove the used battery
5. **[EL-509X/531X/531XG]** Install one new battery. Make sure the "+" side is facing up.
   [EL-531XH] Install one new battery First insert the "⊖" side toward the spring (Fig 3)
6. Replace the cover and screws
7. Press the RESET switch (on the back)
8. Make sure that the display appears as shown below. If the display does not appear as shown, remove the batteries reinstall them and check the display once again



(Fig 1) (Fig 2) (Fig 3)



Automatic Power Off Function

This calculator will turn itself off to save battery power if no key is pressed for approximately 10 minutes.

SPECIFICATIONS

Calculations:	Scientific calculations, statistical calculations, etc.
Internal calculations:	Mantissas of up to 14 digits
Pending operations:	24 calculations 10 numeric values (5 numeric values in STAT mode)
Power source	**[EL-509X/531X]** 1.5V — (DC) Alkaline battery (LR44 or equivalent) × 1 **[EL-531XG]** Built-in solar cells 1.5V — (DC)* Backup battery (Alkaline battery (LR44 or equivalent) × 1) **[EL-531XH]** 1.5V — (DC)* Heavy duty manganese battery (size AAA or R03) × 1
Operating time	**[EL-509X/531X]** Approx 5000 hours **[EL-531XH]** Approx 17000 hours when continuously displaying 55555 at 25°C (77°F) Varies according to use and other factors
Operating temperature:	0°C – 40°C
External dimensions	80 mm (W) × 158 mm (D) × 14 mm (H) 3 5/32" (W) × 6 7/32" (D) × 9/16" (H)
Weight:	**[EL-509X/531X]** Approx 94.5 g (0.21 lb) (including battery) **[EL-531XG]** Approx 94.5 g (0.21 lb) (including battery) **[EL-531XH]** Approx 101 g (0.23 lb) (including battery)
Accessories	Battery × 1 (installed), operation manual and hard case

FOR MORE INFORMATION ABOUT SCIENTIFIC CALCULATOR

Visit our Web site.
http://sharp-world.com/calculator/

SHARP

SHARP CORPORATION

EL-509X
EL-531X
EL-531XG
EL-531XH

CALCULATION EXAMPLES
ANWENDUNGSBEISPIELE
EXEMPLES DE CALCUL
EJEMPLOS DE CÁLCULO
EXEMPLOS DE CÁLCULO
ESEMPI DI CALCOLO
REKENVOORBEELDEN
PÉLDASZÁMÍTÁSOK
PŘÍKLADY VÝPOČTŮ
RÄKNEEXEMPEL
LASKENTAESIMERKKEJÄ
ПРИМЕРЫ ВЫЧИСЛЕНИЙ
UDREGNINGSEKSEMPLER
ตัวอย่างการคำนวณ
أمثلة على الحسابات
计算例子
CONTOH-CONTOH PENGHITUNGAN
CONTOH-CONTOH PERHITUNGAN
أمثلة محاسبات

[1]

① 3(6+2)=	(ON/C) 3 × (6 + 2) =	*21.*
② 3×6+3=	3 × 6 + 3 =	*17.*
③ 3×6−3×2=	3 × 6 + 3 × 2 =	*21.*
→ ①	(▼)	*21.*
→ ②	(▼)	*17.*
→ ③	(▲)	*21.*

[2]

45+285−3=	(ON/AC) 45 + 285 − 3 =	*140.*
18+6 =	18 + 6 ( )	
15−8 =	15 − 8 =	*3.429571429*
42×(−5)+120=	42 × (+/−) 5 + 120 =	*−90.*
	*(6 (−1)^−1	
(5×10^3)−(4×10^−3)=	5 (Exp) 3 − 4 (Exp)	
	(+/−) 3 =	*1'250 000.*

[3]

34+57=	34 + 57 =	*91.*
45+57=	45 + 57 =	*102.*
79−59=	79 − 59 =	*20.*
56−59=	56 − 9 =	*−3.*
56÷8=	56 ÷ 8 =	*7.*
92÷8=	92 ÷ 8 =	*11.5*
68×25=	68 × 25 =	*1'700.*
68×40=	40 =	*2 720.*

[4]

sin | cos | tan | sin^−1 | cos^−1 | tan^−1 | π | DRG▶ | hyp | arc hyp | ln | log | e^x | 10^x | x^−1 | x^2 | x^3 | y^x | ∜ | ³√ | n! | nPr | nCr | %

sin60°]=	(ON/C) sin 60 =	*0.866025403*
$\cos\frac{\pi}{3}$[rad]=	(DRG▶) cos (π ÷ 3 =	*0.707106781*
$\tan^{-1}\frac{1}{1}$=[g]	(DRG▶) (2ndF) tan^−1 1 =	*50.*
(cosh 1.5 + sinh 1.5)^3 =	(hyp cos 1.5 + hyp sin 1.5) x^3 =	*20.08553692*
$\tanh^{-1}\frac{6}{7}$ =	(2ndF) arc hyp tan 6 ÷ 7 =	*0.895879734*
ln 20 =	ln 20 =	*2.995732274*
log 50 =	log 50 =	*1.698970004*
e^3 =	(2ndF) e^x 3 =	*20.08553692*
$10^{1.7}$ =	(2ndF) 10^x 1.7 =	*50.11872336*
$\frac{1}{6}\frac{7}{9}$ =	6 (2ndF) a b/c 7 (2ndF) d/c	*0.309523809*
$8^{-2}-3^6\times 5^2$ =	8 y^x (+/−) 2 − 3 y^x 6 × 5 x^2 =	*−2 024.984375*
$(12^2)^{\frac{1}{4}}$=	12 y^x 2 = (2ndF) y^x 4 =	*6.447419591*
8^3 =	8 (x^3) =	*512.*
$\sqrt{49}-\sqrt[4]{81}$ =	√ 49 − 4 (2ndF) ∜ 81 =	*4.*
$\sqrt[3]{27}$ =	(2ndF) ∛ 27 =	*3.*
4! =	4 (2ndF) n! =	*24.*
$_{10}P_3$ =	10 (2ndF) nPr 3 =	*720.*
$_5O_2$ =	5 (2ndF) nCr 2 =	*10.*
500×25%=	500 × 25 (2ndF) %	*125.*
120+400=? %	120 + 400 (2ndF) %	*30.*
500+(500×25%)=	500 + 25 (2ndF) %	*625.*
400−(400×30%)=	400 − 30 (2ndF) %	*280.*

- The range of the results of inverse trigonometric functions
- Der Ergebnisbereich fui inverse trigonometrische Funktionen
- Plage des résultats des fonctions trigonométriques inverses
- El rango de los resultados de funciones trigonométricas inversas
- Gama dos resultados das trigonométricas inversas
- La gamma dei risultati di funzioni trigonometriche inverse
- Het bereik van de resultaten van inverse trigonometrie
- **Om**fång för resultaten av omvända trigonometriska funktioner
- Käänteisten trigonometristen funktiolden tulosten alue
- Диапазон результатов обратных тригонометрических функций
- Område fos resultater af omvendte trigonometriske funktioner
- 逆三角函数计算结果的范围
- Julat hasil fungsi trigonometri songsang
- Kisaran hasil fungsi trigonometri invers
- ช่วงของผลลัพธ์ของฟังก์ชันตรีโกณมิติผกผัน
- نطاق نتائج الدوال المثلثية العكسية

	$\theta = \sin^{-1} x$, $\theta = \tan^{-1} x$	$\theta = \cos^{-1} x$
DEG	$-90 \le \theta \le 90$	$0 \le \theta \le 180$
RAD	$-\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$	$0 \le \theta \le \pi$
GRAD	$-100 \le \theta \le 100$	$0 \le \theta \le 200$

[5]

DRG▶

90^−1 [rad]	(ON/C) 90 (2ndF) DRG▶	*1.570796327*
→ [g]	(2ndF) DRG▶	*100.*
→ [°]	(2ndF) DRG▶	*90.*
$\sin^{-1}0.8$ = [°]	(2ndF) sin^−1 0.8 =	*53.13010235*
→ [rad]	(2ndF) DRG▶	*0.927295218*
→ [g]	(2ndF) DRG▶	*59.03344706*
→ [°]	(2ndF) DRG▶	*53.13010235*

[6]

A/r=A | RCL | STO | M+ | M− | ANS

A=56	(ON/C) 56 STO A	*56.*
B=68	68 STO B	*68.*
A·2+B×4=	(ALPHA) A × 2 + (ALPHA) B × 4 =	*300.*
	(ON/C) 8 × 2 STO M	*16.*
24÷(8×2)=	24 ÷ (ALPHA) M =	*1.5*
(8×2)×5=	(ALPHA) M × 5 =	*80.*
	(ON/C) STO M	*0.*
$150\sqrt{3}$ M↑	150 × 3 M+	*490.*
+$250\sqrt{2}$M=	250 √ M+	*250.*
−M×5%=	RCL M × 5 (2ndF) %	*35.*
M	(2ndF) M− RCL M	*665.*
$1=¥110	110 STO Y	*110.*
¥26,510=$?	26510 ÷ RCL Y =	*241.*
$2,750=¥?	2750 × RCL Y =	*302'500.*
r = 3cm	3 STO X	*3.*
πr^2 = ?	π (ALPHA) (X x^2) =	*28.27433365*
(→ Y)		
$\frac{24}{4+6}=2.4$ ↓(Ans)	24 ÷ (4 + 6) =	*2.4*
3×(A)+60−(A)=	3 × (ALPHA) ANS + 80 − (ALPHA) ANS =	*32.2*

[7]

8+4=ANS	(ON/C) 8 + 4 =	*10.*
ANS+5	+ 5 =	*15.*
8×2=ANS	8 × 2 =	*16.*
ANS^2	x^2 =	*256.*
44+37=ANS	44 + 37 (+/−)	*81.*
$\sqrt{ANS}$=	√ =	*9.*

[8]

y^x | d/c

$3\frac{1}{2}\times\frac{4}{5}$ = [a b/c]	(ON/C) 3 (a b/c) 1 (a b/c) 2 + 4 (a b/c) 3 ×	*4 ⌟ 5 ⌟ 6*
→[x xxx]	(a b/c) =	*4.533333333*
→[d/c]	(2ndF) d/c	*29 ⌟ 6*
$10^{\frac{3}{5}}$ =	(2ndF) 10^x 2 (a b/c) 3 =	*4.641588834*
$(\frac{7}{5})^5$ =	7 (a b/c) 5 y^x 5 =	*16807 ⌟ 3125*
$(\frac{1}{8})^{\frac{1}{13}}$ =	1 (a b/c) 8 y^x 1 (a b/c) 3 =	*1 ⌟ 2*
$\frac{\sqrt{64}}{\sqrt{225}}$ =	√ 64 (a b/c) √ 225 =	*8 ⌟ 15*
$\frac{2^2}{3^4}$ =	2 y^x 3 (a b/c) 3 y^x 4 =	*8 ⌟ 81*
$\frac{1\frac{2}{3}}{2\frac{3}{5}}$ =	1.2 (a b/c) 2 3 =	*12 ⌟ 23*
$1°2'3''$ =	1 (DMS) 2 (DMS) 3 (a b/c) 2 =	*0°31'1.5"*
$\frac{1\times10^3}{2\times10^8}$ =	1 (Exp) 3 (a b/c) 2 (Exp) 3 =	*1 ⌟ 2*
A = 7	(ON/C) 7 (STO) A	*7.*
$\frac{4}{A}$ =	4 (a b/c) (ALPHA) A =	*4 ⌟ 7*
$1.25+\frac{3}{5}$ = [a.xxx]	1.25 + 2 (a b/c) 5 =	*1.65*
→[a b/c]	(a b/c)	*1 ⌟ 13 ⌟ 20*
1.65	(ON/C) 1.65 =	*1.65*
→[a b/c]	(a b/c)	*1 ⌟ 13 ⌟ 20*
→[d/c]	(2ndF) d/c	*33 ⌟ 20*
→[a.xxx]	(a b/c)	*1.65*

* $A \div 5 \times B = 4\frac{8}{5}$

[9]

(←bin) (←hex) (←oct) (←dec) (NEG) NOT | AND | OR | XOR | XNOR

DEC(25)→BIN	(ON/C) (2ndF) (←DEC) 25 (2ndF) (←BIN)	*11001 b*
HEX(1AC) →BIN	(2ndF) (←HEX) 1AC (2ndF) (←BIN)	*110101100 b*
→PEN	(2ndF) (←BIN) (2ndF) (←PEN)	*3203 p*
→OCT	(2ndF) (←PEN) (2ndF) (←OCT)	*654 o*
→DEC	(2ndF) (←OCT) (2ndF) (←DEC)	*428.*
BIN(1010−100)	(2ndF) (←BIN) 1010 − 100 =	*110 b*
×11 =	× 11 =	*1001 0 b*
BIN(111)→NEG	(NEG) 111 =	*111111001 b*
HEX(1FF)+	(2ndF) (←HEX) 1FF (2ndF) (←OCT) +	*1511 o*
OCT(512)=	512 =	*349 H*
HEX(?)	(2ndF) (←HEX)	
2FEC−	(ON/C) (STO) (M) (2ndF) (←HEX) 2FEC −	*34E H*
2C9E=(A)	2C9E (M+)	
+)2000−	2000 =	*65F H*
1301−(B)	1901 (M+)	*A4d H*
(C)	(RCL) (M)	
1011 AND	(ON/C) (2ndF) (←BIN) 1011 (AND)	
101 = (BIN)	101 =	*1 b*
5A OR C3 = (HEX)	(2ndF) (←HEX) 5A (OR) C3 =	*db H*
NOT 10110 = (BIN)	(2ndF) (←BIN) (NOT) 10110 =	*111101001 b*
24 XOR 4 = (OCT)	(2ndF) (←OCT) 24 (XOR) 4 =	*20 o*
B3 XNOR 2D = (HEX)	(2ndF) (←HEX) B3 (XNOR) 2D =	*FFFFFFFFe1 H*
→DEC	(2ndF) (←DEC)	*−159.*

[10]

D°M'S | DEG

12°39'18.05" →[10]	(ON/C) 12 (DMS) 39 (DMS) 18.05 (2ndF) (←d/c)	*12.65501389*
123 678 →[60]	123 678 (2ndF) (←DEG)	*123°40'40.8"*
3h30m45s + 6h45m36s = [60]	3 (DMS) 30 (DMS) 45 + 6 (DMS) 45 (DMS) 36 =	*10°16'21"*
123°56 12" + 0°0'34.567" = [60]	1234 (DMS) 56 (DMS) 12 + 0 (DMS) 0 (DMS) 34.567 =	*1234°56'47"*
3h46m − 1°69' = [60]	3 (DMS) 46 − 1 69 = (2ndF) (←DEG)	*2°3'36"*
$\sin62°12'24"$ = [10]	(sin) 62 (DMS) 12 (DMS) 24 =	*0.884635235*

[11]

(←rθ) (→xy) | (←→)

$\begin{cases} x=8 \\ y=4 \end{cases} \to \begin{cases} r= \\ \theta=[°] \end{cases}$	(ON/C) 8 (2ndF) ( ) 4 (2ndF) (←rθ) [r] (2ndF) (←→) [θ] (2ndF) (←→) [r]	*7.211102551* *33.69006753* *7.211102551*
$\begin{cases} r=14 \\ \theta=36[°] \end{cases} \to \begin{cases} x= \\ y= \end{cases}$	14 (2ndF) ( ) 36 (2ndF) (→xy) [x] (2ndF) (←→) [y] (2ndF) (←→) [x]	*11.32637292* *8.229993532* *11.32637292*

[12]

MDF | SET UP

5−9=ANS	(ON/C) (SET UP) 5 9 (SET UP) 1	
ANS×9=	5 − 9 =	*−4*
[FIX,TAB=1]	(√) 9 (x^2)	*5.0*
	5 − 9 = (2ndF) (M3P)	*−4*
	× 9 = *3	*5.4*
	(SET UP) 3	

*1 5.5555555555555×10^−1×9
*2 0.6×9

[13]

DATA | (↑) | (↓) | Σx | Σx^2 | Σy | Σy^2 | Σxy | r | a | b | c | x^ | y^

DATA		
95	(MODE) 1 (STAT)	*0.*
80	95 (DATA)	*1.*
60	80 (DATA)	*2.*
75	(DATA)	*3.*
75	75 (↓) 3 (DATA)	*4.*
75	50 (DATA)	*5.*
50		
$\bar{x}$=	(RCL) (Σy)	*75.71428571*
σx=	(RCL) (σx)	*12.37179148*
n=	(RCL) (n)	*7.*
Σx=	(RCL) (Σx)	*530.*
Σx^2=	(RCL) (Σy)	*41'200.*
$s x$=	(RCL) (Σx)	*13.3630621*
$s x^2$=	(RCL) (Σy)	*178.5714286*
(95−$\bar{x}$)/$s x$ ×10+50=	(95 − (Ans) (Σx) / (Σx) × 10 + 50 =	*64.43210706*

x	y	
2	5	(MODE) 1 (STAT) 0.
8	9	2 (DATA) 5 (DATA) 1.
12	24	8 (DATA) 9 (DATA) 2.
21	40	12 (↓) 24 (DATA) 3.
21	40	21 (↓) 40 (DATA) 4.
15	25	15 (↓) 25 (DATA) 5.
21	40	(RCL) (x^) 1.05026197
15	25	(RCL) (b) 1.826044186
		(RCL) (r) 0.998176343
		(RCL) (Σx) 8.541216597
		(RCL) (Σy) 15.67223812
x=3 → y'=?	3 (2ndF) (x^)	*6.528394286*
y=46 → x'=?	46 (2ndF) (y^)	*24.61590706*

x	y	
12	41	(MODE) 1 (STAT) 0.
8	13	12 (DATA) 41 (DATA) 1.
5	2	8 (DATA) 13 (DATA) 2.
23	200	5 (DATA) 2 (DATA) 3.
15	71	23 (DATA) 200 (DATA) 4.
		15 (DATA) 71 (DATA) 5.
		(RCL) (a) 5.357506761
		(RCL) (b) −3.120289665
		(RCL) (c) 0.503334057
x=10 → y'=?	10 (2ndF) (y^)	*24.9680159*
y=22 → x'=?	22 (2ndF) (x^)	*9.63201409*
	(2ndF) (←→)	*−3.432772026*
	(2ndF) (←→)	*9.63201409*

[14]

DATA | (▲) | (▼)

DATA		
	(MODE) 1 (STAT)	*0.*
30	30 (DATA)	*1.*
40	40 (↓) 2 (DATA)	*2.*
40	50 (DATA)	*3.*
50		
↓		
DATA		
30	(▼) (▼) (▼) (DATA)	
45	45 (↓) 3 (DATA)	*X2 = 45.*
45	(▼)	*N2 = 3.*
45		
60	(▼) 60 (DATA)	*X3 = 60.*

[15]

$$\bar{x} = \frac{\Sigma x}{n} \qquad \sigma x = \sqrt{\frac{\Sigma x^2 - n\bar{x}^2}{n}}$$

$$s x = \sqrt{\frac{\Sigma x^2 - n\bar{x}^2}{n-1}} \qquad \Sigma x = x_1 + x_2 + \cdots + x_n \quad \Sigma x^2 = x_1^2 + x_2^2 + \cdots + x_n^2$$

$$\bar{y} = \frac{\Sigma y}{n} \qquad \sigma y = \sqrt{\frac{\Sigma y^2 - n\bar{y}^2}{n}}$$

$$s y = \sqrt{\frac{\Sigma y^2 - n\bar{y}^2}{n-1}} \qquad \Sigma xy = x_1y_1 + x_2y_2 + \cdots + x_ny_n \quad \Sigma y = y_1 + y_2 + \cdots + y_n \quad \Sigma y^2 = y_1^2 + y_2^2 + \cdots + y_n^2$$

[16]

Function	Dynamic range
Funktion	zulässiger Bereich
Fonction	Plage dynamique
Función	Rango dinámico
Função	Gama dinâmica
Funzioni	Campi dinamici
Funcie	Rekencapaciteit
Függvany	Magnrngadott szám'tási tartomány
Funkce	Dynamický rozsah
Funktion	Definitionsområde
Funkcio	Dynaaminen ala
Φυνμτ	Δπεγκεσεν μαπαζον
Funktion	Dynamikområde
ฟังก์ชัน	พิสัยไดนามิกสามารถ
وظيفة	المدى الديناميكي
函数	动态范围
Fungsi	Julat dinamik
Fungsi	Kisaran dinamis
وظيفة	مجموعة ديناميكية

	$0 \le |x| \le n < 9999999999^*$ $0 \le |y| \le 99$	
$_nC_r$	$\frac{n!}{(n-r)!} < 10^{100}$	
↔DEG ↔D°M'S	0°0'0.00001" ≤ |x| < 10000°	
$x, y \to r, \theta$	$\sqrt{x^2+y^2} < 10^{100}$	
$r, \theta \to x, y$	$0 \le r < 10^{100}$ DEG |θ| < 10^{10} RAD |θ| < $\frac{2\pi}{360} \times 10^{10}$ GRAD |θ| < $\frac{400}{360} \times 10^{10}$	
DRG▶	DEG→RAD GRAD→DEG |x| < 10^{100} RAD→GRAD |x| < $\frac{\pi}{2} \times 10^{99}$	
→DEC	DEC |x| = 9999999999	
→BIN	BIN 1000000000 ≤ x ≤ 1111111111 0 ≤ x ≤ 111111111	
→PEN	PEN 2222222223 ≤ x ≤ 4444444444 0 ≤ x ≤ 2222222222	
→OCT	OCT 4000000000 ≤ x ≤ 7777777777 0 ≤ x ≤ 3777777777	
→HEX	HEX FDABF41C01 ≤ x ≤ FFFFFFFFFF 0 ≤ x ≤ 2540BE3FF	
AND OR XOR XNOR		
NOT	BIN 1000000000 ≤ x ≤ 1111111111 0 ≤ x ≤ 111111111 PEN 2222222223 ≤ x ≤ 4444444444 0 ≤ x ≤ 2222222221 OCT 4000000000 ≤ x ≤ 7777777777 0 ≤ x ≤ 3777777777 HEX FDABF41C01 ≤ x ≤ FFFFFFFFFF 0 ≤ x ≤ 2540BE3FF	
NEG	BIN 1000000001 ≤ x ≤ 1111111111 0 ≤ x ≤ 111111111 PEN 2222222225 ≤ x ≤ 4444444444 0 ≤ x ≤ 2222222222 OCT 4000000001 ≤ x ≤ 7777777777 0 ≤ x ≤ 3777777777 HEX FDABF41C01 ≤ x ≤ FFFFFFFFFF 0 ≤ x ≤ 2540BE3FF	
sin x, cos x, tan x	DEG |x| < 10^{10} (tan x : |x| ≠ 90 (2n−1))* RAD, |x| < $\frac{\pi}{180} \times 10^{10}$ (tan x : |x| ≠ $\frac{\pi}{2}$(2n−1))* GRAD: |x| < $\frac{200}{\pi} \times 10^{10}$ (tan x : |x| ≠ 100 (2n−1))*	
$\sin^{-1}x$, $\cos^{-1}x$	|x| ≤ 1	
$\tan^{-1}x$, $\sqrt{x}$	|x| < 10^{100}	
ln x, log x	$10^{-99} \le x < 10^{100}$	
y^x	• y > 0 $-10^{100} < x \log y < 100$ • y = 0, 0 < x < 10^{100} • y < 0 x = n (0 < |x| < 1, $\frac{1}{x}$ = 2n−1, x ≠ 0)*, $-10^{100} < x \log |y| < 100$	
$\sqrt[x]{y}$	• y > 0 $-10^{100} < \frac{1}{x} \log y < 100$ (x ≠ 0) • y = 0, 0 < x < 10^{100} • y < 0 x = 2n−1 (0 < |x| < 1, $\frac{1}{x}$ = n, x ≠ 0)*, $-10^{100} < \frac{1}{x} \log |y| < 100$	
e^x	$-10^{100} < x \le 230.2585092$	
10^x	$-10^{100} < x < 100$	
sinh x, cosh x, tanh x	|x| ≤ 230.2585092	
$\sinh^{-1}x$	|x| < 10^{50}	
$\cosh^{-1}x$	$1 \le x < 10^{50}$	
$\tanh^{-1}x$	|x| < 1	
x^3	|x| < 10^{33}	
x^4	|x| < 2.15443469×10^{25}	
$\sqrt{x}$	$0 \le x < 10^{100}$	
x^{-1}	|x| < 10^{100} (x ≠ 0)	
n!	$0 \le n \le 69^*$	
$_nP_r$	$0 \le |n| \le 9999999999^*$ $\frac{n!}{(n-r)!} < 10^{100}$	

* n, r: Integer / ganze Zahlen / enteri / entero / inteiro / Interi / geheel getal / egész számok / celé čísla / hellal / kokonaisluku / целые / hattal / จำนวนเต็ม / عدد صحيح / 整数 / integer / bilangan bulat / عدد صحيح

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